U.S. Department
of Transportation
**Research and
Special Programs
Administration**

OCT 1 2 2000

400 Seventh St., S.W.
Washington, D.C. 20590

DOT-E 9847
(THIRD REVISION)

EXPIRATION DATE: August 31, 2002

(FOR RENEWAL, SEE 49 CFR § 107.109)

1. GRANTEE: FIBA Technologies, Inc.
Westboro, MA

2. PURPOSE AND LIMITATIONS:

a. This exemption authorizes the transportation in commerce of certain gases in 9-5/8 inch diameter DOT 3A and DOT 3AA cylinders (tubes) that have been retested by means of an acoustic emission (AE) and ultrasonic examination (UE) procedure in place of the internal visual inspection and hydrostatic retest required in § 173.34(e). This exemption provides no relief from the Hazardous Materials Regulations (HMR) other than as specifically stated herein.

b. The safety analyses performed in development of this exemption only considered the hazards and risks associated with transportation in commerce.

c. Party status will not be granted to this exemption.

3. REGULATORY SYSTEM AFFECTED: 49 CFR Parts 106, 107 and 171-180.

4. REGULATIONS FROM WHICH EXEMPTED: 49 CFR §§ 173.34(e): the introductory paragraph, the Table, and paragraphs (1), (3), (4), and (6); and 173.302(c)(2), (3), and (4) in that the acoustic emission and ultrasonic examination is performed in place of the hydrostatic test and the internal visual inspection.

5. BASIS: This exemption is based on the application of FIBA Technologies, Inc. (FIBA) dated November 23, 1999, and supplemental information dated March 25 and July 3, 2000 submitted in accordance with §§ 107.105 and 107.109 and the public proceeding thereon.

6. HAZARDOUS MATERIALS (49 CFR § 172:101):

| Proper Shipping Name/ Hazardous Materials Description | Hazard Class/ Division | Identi-fication Number | Packing Group |
|---|---|---|---|
| Liquefied or nonliquefied compressed gases, or mixtures of such compressed gases, authorized in the Hazardous Materials Regulations for transportation in DOT 3A and 3AA cylinders. | Specific Hazard Class and Division applicable to the compressed gas or gas mixture to be shipped. | As listed in 49 CFR Part 172.101 for specific compressed gas or gas mixture. | N/A |

7. SAFETY CONTROL MEASURES:

a. PACKAGING - Packaging prescribed is a DOT Specification 3A or 3AA cylinder, mounted on a cylinder trailer vehicle chassis or a cylinder module equipped with a frame that is subjected to periodic retesting, reinspection and marking prescribed in § 173.34(e), except that the cylinder is examined by an AE and UE method in place of the hydrostatic pressure test and internal visual inspection prescribed in § 173.34(e)(1). Each cylinder must have a nominal diameter of 9-5/8 inch and a minimum water capacity of 140 liters (36.9 U.S. gallons). The minimum wall thickness of DOT 3A cylinders may not be less than 0.280 inch and the minimum wall thickness of DOT 3AA cylinders may not be less than 0.225 inch. This exemption applies to DOT 3A and DOT 3AA cylinders with a marked service pressure of 2400 psig or greater. A cylinder that has been exposed to fire or to excessive heat (temperatures of 1000°F. or greater) may not be retested under the terms of this exemption.

Each cylinder must be retested at least once every five years in accordance with the AE and UE procedure described in FIBA's application for exemption on file with the Office of Hazardous Materials Exemption and Approvals (OHMEA) except as modified herein.

b. AE Test Procedure and Equipment - The AE test procedure and equipment described in FIBA's application for exemption must meet test procedure and apparatus requirements prescribed in American Society for Testing and Materials (ASTM) E 1419-96 (Standard Test Method for Examination of Seamless, Gas-Filled, Pressure Vessels Using Acoustic Emission) except as specifically stated herein:

(1) For system performance Pencil lead break or electronic pulsar may be used. Electronic Pulsation or lead break must be on the cylinder surface at a minimum distance of 4-inches (10-cm) from each sensor. The AE signal for each sensor during performance check must have a sensitivity equal or greater than 70 dBV.

(2) Areas of cylindrical portion of each tube examine by AE test method having five or more AE events that occur within 8-inch (20.3-cm) axial distance, must be examined by UE described herein.

(3) The rejection criteria as established by fracture mechanics for the cylinders retested under this exemption is a flaw with a maximum depth of 0.060-inch (0.150-cm).

c. UE Equipment performance, calibration and test procedure - The UE equipment used must have a capability for examining at frequencies from 1 to 5 $MH_z$. The instrument, search units and related equipment shall be the pulse echo type and be capable of detecting and measuring the reference standard notches. The ultrasonic instrument shall generate an A-scan display, showing signal amplitude and distance locations of the reference standard notch.

(1) UE Reference Standard (Calibration Ring)- The reference standard (calibration ring) shall be cut from the same type cylinder that is being examined. The reference standard must have the same nominal diameter, wall thickness, material, heat treatment, and surface condition.

A drawing representing the reference standard and a certification statement signed by a person certified as a Level III operator (in UE) must be available for inspection for each reference standard (calibration ring) at each site where testing is performed. A reference standard drawing must identify dimensions (length, width, and depth) of each artificial defect.

(i) Reference standard notches must be (square edge or "v" bottom) introduced on internal and external surfaces of the reference standard.

(ii) One (0.060 inch deep) internal notch must be placed into a single reference standard (calibration ring).

(iii) One (0.060 inch deep) external notch must be placed into a single reference standard.

(2) UE Standardization (Calibration) Procedure -

(i) Place the search unit on the outside surface of the reference standard (calibration ring) and adjust the gain and location of the search unit until the indication from the internal notch is identified.

(ii) Place the shear wave search unit at a close distance (half-skip distance) from a designated reference standard notch on the internal surface of the reference standard (calibration ring). Increase the gain until the indicated signal is maximized at 80% of the screen height.

(iii) Without changing the sensitivity control, obtain three additional indications at 90-, 120-and 180-degree positions around the ring's circumference by moving the search unit on the ring, away from the reference notch (internal or external). It may be necessary to increase the horizontal display range control on the instrument.

(iv) Mark the maximum peak of each indication on the display screen. Identify the Distance Amplitude Correction (DAC) curve by connecting the peaks. The same procedure will be used to generate DAC curve for the external notch. If the UE system is equipped with a DAC curve program, marking of DAC curves on the screen is not applicable.

(v) To obtain UE calibration for the external notch, the above procedure must be repeated.

(3) UE Test Procedure - Prior to ultrasonic examination, each AE indication must be clearly marked. A minimum of 6-inch of surface shall be scanned at each side of the marked location.

(i) Circumferential scanning shall be performed in both clockwise (CW) and counter clockwise (CCW) directions to ensure adequate coverage of the marked location.

(ii) For difficult to reach locations on cylinders that are stacked in the middle rows, the search unit may be mounted at the end of an extension rod. If an extension rod is used for testing, standardization must be under the same condition as testing.

(iii) The DAC curve must be used as a threshold for acceptance/rejection of a flaw's depth (0.060 inch) by determining the amplitude of the reflected signal from the flaw as a percentage of the DAC curve. Any detected flaw with amplitude that exceeds the DAC curve should be considered a potential for rejection. After the flaw has been located, it shall be re-examined by scanning from several directions utilizing the first half-skip distance to confirm that the maximum signal amplitude from the flaw is above the DAC curve. To achieve maximum signal amplitude, circumferential scanning may be combined with a slow twisting motion to detect the part of the discontinuity that may not be oriented completely perpendicular to the incoming ultrasonic pulse. The cylinder containing the flaw may require removal from the stack to allow access to the flaw location.

(iv) When a removal of a cylinder from service is considered, another examination technique such as reflected tip diffraction may be used to accurately evaluate the flaw (depth, length and orientation).

d. Rejected cylinders. When a cylinder fails external visual inspection or meets the rejection criteria of paragraph 7.b.(3), the retester must stamp a series of X's over the DOT specification number and marked service pressure, or stamp "CONDEMNED" on the shoulder, or neck using a steel stamp, and must notify the cylinder owner, in writing, that the cylinder is rejected and may not be filled with hazardous material for transportation in commerce.

(1) Alternatively, at the direction of the owner, the retester may render the cylinder incapable of holding pressure.

(2) If a condemned cylinder contains hazardous materials and the testing facility does not have the capability of safely removing the hazardous material, the retester must stamp the cylinder "CONDEMNED" and affix conspicuous labels on the cylinder(s) stating: "REJECTED DOT-E 9847. RETURNING TO ORIGIN FOR PROPER DISPOSITION". A current copy of this exemption must accompany each shipment of condemned cylinders transported for the disposal of hazardous material.

e. Marking:

(1) An exterior cylinder on each side of a cylinder module must be marked with letters at least 2 inches high on a contrasting background "DOT-E 9847".

(2) The exterior of the trailer cabinet of the vehicle chassis to which the cylinders are affixed must be marked with letters at least 2 inches high on a contrasting background "DOT-E 9847".

(3) The current retest date must be marked on the rear bulkhead inside the trailer cabinet at approximately eye level above the withdrawal valve for cylinder trailers and on the bulkhead near the withdrawal valve for cylinder modules. In the event retest dates of cylinders differ in a trailer cluster, the retest date displayed will be that of the oldest retest date, meaning the date of the retest that must occur first.

f. Report: An AE and UE report must be generated for each cylinder that is examined. The report must be on file at the test site, and made available to a DOT official when requested. The report must include the following:

1 AE and UE equipment, model and serial No.
2 Specification of the standard reference used to UE the cylinder. Standard reference (calibration ring)must be identified by serial number or other stamped identification marking.
3 Cylinder serial number and type.
4 Maximum allowable filling pressure.
5 Minimum prescribed sidewall.
6 Number of events at each location.
7 Pressure associated with each event.
8 Description of each AE event (amplitude, duration, energy, etc.)
9 Size of each defect measured (length and depth).
10 Type of each defect measured (crack, pitting, etc.)
11 Defect location relative to each sensor.
12 Defect angular location defined by clock direction(3, 5, or 9 O'clock)
13 Defect location relative to sidewall (interior, outer surface, inner surface).
14 AE and UE technicians' name and certification level
15 Test Date
16 Acceptance/rejection results.

g. Personnel Qualification: Each person who performs retesting or who evaluates or certifies retest results must meet the following requirements:

(1) Project Manager - is the senior manager of FIBA responsible for compliance with DOT regulations including this exemption. Additionally, the project manager must ensure that each operator and senior review technologist maintain the required certification.

(2) The personnel responsible for performing cylinder retesting under this exemption shall be qualified to an appropriate Level (Level I, II or III)- AE and UE in accordance with the American Society for Nondestructive Testing (ASNT) Recommended Practice SNT-TC-1A-1996 depending upon the assigned responsibility as described below:

(i) A Level II Operator may perform system startup, calibrate the system, and review and certify the test results when a written acceptance and rejection criteria for cylinders have been provided by a Senior Review Technologist. Based upon written criteria, the Level II Operator may authorize cylinders that pass the retest to be marked in accordance with paragraph 7(e) of this exemption. However, a person with Level I certification may perform a system startup, check calibration, and perform AE and UE under the direct guidance and supervision of a Senior Review Technologist or a Level II Operator, either of whom must be physically present at the test site so as to be able to observe examination conducted under this exemption.

(ii) Senior Review Technologist (SRT) - is a person who reviews overall test results, provides supervisory training and technical guidance to operators, and reviews and verifies the retest results. A SRT must have a Level III Certification in AE and UE, and a thorough understanding of the HMR pertaining to the re-qualification and reuse of the DOT cylinders authorized under this exemption. The SRT must prepare and submit the reports required in paragraph 7(f) and annually verify that the AE and UE program is being operated in accordance with the requirements of this exemption.

h. OPERATIONAL CONTROLS:

(1) No person may perform inspection and testing of cylinders subject to this exemption unless -

(i) that person is an employee or agent of FIBA and has a current copy of this exemption at the location of such inspection and testing, and;

(ii) complies with all the terms and conditions of this exemption.

(2) Each facility approved by OHMEA to test cylinders under the terms of this exemption must have a resident operator with at least a Level II Certification in UE.

8. SPECIAL PROVISIONS.

a. Cylinders retested in accordance with paragraph 7 above may be charged to 110 percent of marked service pressure in accordance with § 173.302(c).

b. A statement of qualifications, for each "qualified AE and UE tester" used under this exemption and information in support thereof, must be maintained by FIBA. The location of this statement, for each "qualified AE and UE tester", must be identified to the Office of Hazardous Materials Exemptions and Approvals.

c. A person who is not a holder of this exemption who receives a package covered by this exemption may reoffer it for transportation provided no modifications or changes are made to the package and it is reoffered for transportation in conformance with this exemption and the HMR.

d. A current copy of this exemption must be maintained at each facility where the package is offered or reoffered for transportation.

e. Motor carriers operating under the terms of this exemption must have a "Satisfactory" or "Conditional" safety rating as prescribed in 49 CFR Part 385.

f. The marking of DOT-E 9847 on the cylinder trailer or cylinder module prescribed in paragraph 7.e above certifies compliance with all of the terms and conditions of this exemption.

9. MODES OF TRANSPORTATION AUTHORIZED: Motor vehicle, and cargo vessel only.

10. MODAL REQUIREMENTS: A current copy of this exemption must be carried aboard each cargo vessel or motor vehicle used to transport packages covered by this exemption.

11. COMPLIANCE: Failure by a person to comply with any of the following may result in suspension or revocation of this exemption and penalties prescribed by the Federal hazardous materials transportation law, 49 U.S.C. 5101 et seq:

- All terms and conditions prescribed in this exemption and the Hazardous Materials Regulations, 49 CFR Parts 171-180.

- o Registration required by § 107.601 et seq., when applicable.

Each "Hazmat employee", as defined in § 171.8, who performs a function subject to this exemption must receive training on the requirements and conditions of this exemption in addition to the training required by §§ 172.700 through 172.704.

No person may use or apply this exemption, including display of its number, when this exemption has expired or is otherwise no longer in effect.

12. REPORTING REQUIREMENTS: The carrier is required to report any incident involving loss of packaging contents or packaging failure to the Associate Administrator for Hazardous Materials Safety (AAHMS) as soon as practicable. (Sections 171.15 and 171.16 apply to any activity undertaken under the authority of this exemption.) In addition, the holder(s) of this exemption must inform the AAHMS, in writing, of any incident involving the package and shipments made under the terms of this exemption.

Issued in Washington, D.C.:

OCT 12 2000

Robert A. McGuire
Associate Administrator for
Hazardous Materials Safety

(DATE)

Address all inquiries to: Associate Administrator for Hazardous Materials Safety, Research and Special Programs Administration, Department of Transportation, Washington, D.C. 20590. Attention: DHM-31.

The original of this exemption is on file at the above office. Photo reproductions and legible reductions of this exemption are permitted. Any alteration of this exemption is prohibited.

Copies of exemptions may be obtained from the AAHMS, U.S. Department of Transportation, 400 7th Street, S.W., Washington, DC 20590-0001, Attention: Records Center, 202-366-5046.

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